Ohio Agricultural Experiment Station.

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The Early and Late Blight of Potatoes and How to Combat Them.*

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One of the most serious drawbacks to potato growing in Ohio is the blighting of the plants. There are two distinct forms of the blight, known as the *early* and the *late* blight. The technical description of these diseases has no place in this circular as it deals only with the practical phase of the subject. There are, however, certain differences which may be noted. The early blight does not spread from hill to hill nearly so rapidly as does the late blight. Under favorable conditions for the multiplication and growth of the spores, the late blight will practically destroy the vines in a field in a few days.

The early blight will, in time, kill the vines of one variety and a different variety in an adjoining row may be practically free from the disease at the same date. In other words, some varieties are more resistant to the early blight than others. While our observation has not extended over so long a period in the case of the late as in that of the early blight, it seems quite certain that there is not nearly so much difference in the susceptibility or resistance of varieties to the late as there is to the early blight. Spraying is more effective in keeping the late blight in check than the early blight.

One of the most serious results of the late blight is the decay of the tubers following an attack of this disease. The rotting begins before the potatoes are dug and may continue after they are stored. The early blight is not associated with rotting of the potatoes.

*This circular is an extract of a portion of a bulletin which has been prepared but which, owing to lack of sufficient press capacity, it has been impossible to pul lish in time for this season's work. The circular deals with such features of the bulletin as are in season.

TREATMENT FOR THE EARLY BLIGHT.

Spraying the vines has not proven a satisfactory means of keeping the early blight in check. Much can be done, however, to lessen the damage resulting from this disease by planting only such varieties as are more or less resistant to the disease. In the Station tests of over 150 varieties the following have shown decided resistance to the early blight: Livingston, Magnum Bonum, Spring Valley Champion, Summers, June, and White Beauty.

The number of varieties which have shown this tendency in a less marked degree is quite large. The following varieties are among this number: American Giant, Carman No. 3, Dewey, Early Michigan, Ionia Seedling, Lily White, Oom Paul, Pat's Choice, President Roosevelt, Sensation, Sir Walter Raleigh. Thorburn's White Peachblow, White Giant, Whiton's White Mammoth, and World Wonder.

There is not only a difference between varieties as to the susceptibility or resistance to the early blight, but there is also a difference in hills of the same variety. This is more noticeable with some varieties than with others.

The Station has been making tests of several varieties of potatoes the past three seasons in which those grown from seed selected from blight resistant hills have been compared with those grown from seed which has not been selected. In every case vines from the resistant seed remained green much longer than those from the seed which had not been selected for blight resistance. The yield was also increased in nearly every instance.

One variety, Whiton's White Mammoth, was tested on a larger scale than any of the others. Two rows of this variety, each eight rods long, were planted with seed which was selected from resistant hills. The selection was made in 1903 and 100 hills were grown 1904, the seed of which was used, without further selection, for the larger test in 1905. One row of the same length, was planted with seed which had not been selected from resistant hills, the latter being planted between the other two rows. These rows were treated as nearly alike as possible during the season. When dug and weighed it was found that the average total yield of the resistant rows was 25 per cent greater than of the non-resistant row, and the yield of marketable potatoes was 40 percent greater.

Besides the selection of blight resistant varieties, there is no doubt that much can be done in the way of building up varieties which will be resistant to the early blight by selecting seed from resistant hills. All of the extra labor necessary is to go over the rows, when most of the vines are badly blighted, and drive a stake at each hill which shows a resistant tendency, these hills to be dug by hand and saved for seed.

When digging, all hills which are poor in yield, even though they may have been very resistant to blight, should be thrown out. By planting the seed and saving all of the product to plant for seed another year, a sufficient quantity can be secured in two or three seasons to plant a considerable area. In the Station tests the seed from resistant hills has retained that characteristic for three years.

A WORD OF CAUTION.

There are varieties of potatoes being offered on the market as "blight proof". We have never seen a variety that can truly be said to be "blight proof". Blight or disease *resistant* is very different from blight or disease *proof*. The former means that the variety has within itself the power to resist disease up to a certain point. The latter, that the variety is immune, a condition which is not known to exist.

TREATMENT FOR THE LATE BLIGHT.

The late blight first made its appearance at the Station trial grounds in 1904. From observations made over this brief period it would seem that little can be done in the way of overcoming this disease by the selection of varieties or hills, as compared with what may be accomplished in the case of the early blight. Spraying, however, is much more effective in lessening the damage from the late than from the early blight.

In 1905, after the fertilizer test plots, which consist of 34 one-tenth acre plots, had been sprayed twice with Bordeaux and arsenate of lead, it was decided to leave about one-fourth of each of these plots without further spraying, and to spray the remaining three-fourths of all the plots with Bordeaux, as a preventive of late blight. These latter sprayings were made on August 5, 18 and 26. The vines were given a thorough spraying each time, and the formula used was the one given in the Spray Calendar (Bulletin 147) which is issued by this Station. It is 4 pounds of blue vitriol and 4 pounds of quick lime to 50 gallons of water.

Soon after the spraying of August 5th had been made the vines on the unsprayed area blighted very badly. The difference between the sprayed and the unsprayed vines became more marked each day until the first of September, when the unsprayed vines were dead and the sprayed vines were blighting very little.

At digging time it was not practicable to dig the sprayed and unsprayed area of each of the plots separately. Instead, a cross section one rod long was marked off on the sprayed and unsprayed parts of each of nine plots, which were well distributed over the area. The potatoes in these sections were dug by hand and weighed. The average gain of the sprayed over the unsprayed portion was 36 per cent, or 89 bushels per acre.

The Geneva (New York) Station has been conducting cooperative experiments with farmers in different parts of that state. The following is taken from the summary of Bulletin 264 of that Station:

"In fourteen farmers' business experiments, including 180 acres, the average gain due to spraying was 62¼ bushels per acre; the average total cost for each spraying, 93 cents per acre; and the average net profit, based on the market price of potatoes at digging time, $24.86 per acre."

*The Plant Pathologist of this Station has called attention to the prevalence of this disease throughout the state and has recommended the use of Bordeaux as a preventive. (Bulletin 147:) In this circular reference will be made only to the practical tests made by the Horticultural department.

It will be seen from this that in New York, where the late blight has been prevalent for many years, spraying with Bordeaux has proven an effective and profitable means of combatting it. This same disease has become quite common in Ohio, and, although it will no doubt be much more severe in its attacks some seasons than others, we may expect it to be present every year.

The potato growers of Ohio should make up their minds that they will be compelled to spray to lessen the damage from this disease or suffer serious losses.

The number of sprayings it will be necessary to make depends somewhat upon the season. If rainy weather prevails it will be necessary to spray more frequently than if it be comparatively dry; not only because the rain will wash the spray material off the vines, but also because damp weather is favorable to the development of the disease. A good general rule is to begin spraying when the vines are about six inches high and spray every ten days or two weeks throughout the season. Arsenate of lead, Paris green, or arsenate of soda, should be used in combination with Bordeaux when the Colorado beetle is present in sufficient numbers to need attention. After these beetles have been destroyed or have disappeared the Bordeaux can be used alone. Further information on the preparation and application of the Bordeaux mixture and other spray materials is given in the Spray Calendar published by this Station. (Bulletin 147.)

For an area of less than one acre a small compressed air or knapsack sprayer will be very satisfactory. Where fruits as well as potatoes are to be sprayed the barrel spray-pump outfit will be most economical. By mounting the barrel on a one horse, two-wheeled cart, at the rear of which a ¾ inch pipe of sufficient length to cover 4 rows and provided with nozzles is attached, one man can do the spraying unassisted.

If the area of potatoes to be sprayed is 10 acres or more, some form of power sprayer can be used to advantage. Gear sprayers are the most common form of power sprayer, but the compressed air sprayer has some advantages over the gear sprayer, although it is more expensive to operate.